

**From:** Jerry Hintze  
**To:** Dennis Killian; George Cross  
**Date:** 3/22/2007 2:53 PM  
**Subject:** Bob Allen - Siemens

**CC:** Garry Christensen; Wood, Dean

Mr. Allen works in the engineering department for Siemens and he will be responsible for CFD modeling of the burner and FEA of the nozzle tip. He will also be heading up the process of coming up with a recommended solution for our problem.

Garry reviewed past operating data and took him out and showed him the burner nozzles west of Unit 2. Mr. Allen took some of the nozzle material for metallurgical analysis. He did not admit to being a burner expert but, he had many years of experience in the industry. The engineer who will be doing the models formally worked for B&W and was involved with the original design of their low NOx burners. He did not believe that this will be a difficult problem to resolve.

They will get the original design information from ABT but, plan to work independently on the design solution. He indicated that they should have a proposal to us in two - three weeks with their recommended solutions.

**IP7021086**

# History of IPSC Experience with ABT Burners

Presentation for Siemens, March 15, 2007

# Contract History

## ABT Contract for New Burners

- Established on September 16, 2003
- Replace original Unit 2 B&W burners in-service since 1987
  - Unit 1's were replaced in 1992, thermal distortion of registers
  - Unit 2's were modified in 1991, modified backplates
- 48 burners with flame scanners and burner air flow monitoring, installed March 2004

# Contract Economics

- Original Contract was for \$2,237,415
- November 12, 2003 Addendum
  - > 253 MA Materials Upgrade \$40,800
  - > Coal Flow Divider, X-Vane Spool \$40,800
  - > Air Flow Measurement Upgrade \$35,220
- Installation on separate contract \$1,616,800
- Total Cost to IPSC \$3,971,035
- Total Amount Paid ABT on Original Contract \$2,354,235

# Project Design Objectives

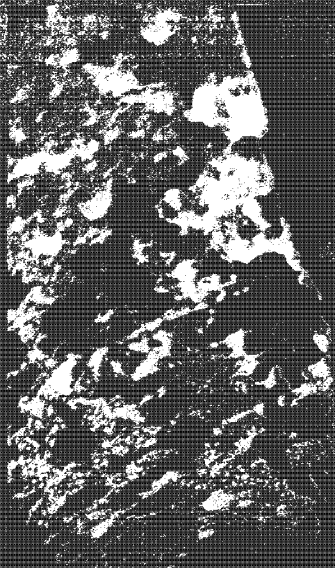
- Environmental performance better or same as original B&W
  - No regulatory reason to change
- Improve register operation and availability
- Minimize erosion of coal flow components
  - Specified four-year minimum life at maximum coal flow
- Thermal stability - designed to handle thermal environment

# Performance of ABT Burners

- Initial performance of burners was good
- Met or exceeded NOx, LOI and CO Requirements
- Flame stability was good over the load range
- Register adjustability was good - Major design objective

# Problems Started After First Year of Service

Fire on F3 Burner, June 25, 2005



- Burner was removed from service
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# Inspected F Row Burners

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- Found more problems, first knowledge of full scope of issues
  - Erosion of the coal nozzle side walls on the horizontal plane, complete hole on F6
  - Erosion of the nozzle tip
  - Cracks in the nozzle tip
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# Purchased Repair Parts from ABT

December, 2005 - January, 2006



- Purchased burner tips segments and liners for burner barrels
  - IPSC paid \$199,100 for materials from ABT
  - Also removed kicker on elbow
- Planned to install the parts during the April, 2006 Unit 2 outage.

# April 2006 Outage

Damage Was Extensive

- All 48 fuel injectors were pulled and inspected
- 20 of the tips were irreparable and replaced with straight tips. 28 had tip liners installed.
- 7 burners with holes in the injector barrel on the horizontal plane. Many more very thin. All had erosion in this area.
- Diffuser and wear liner installed on all 48 burners

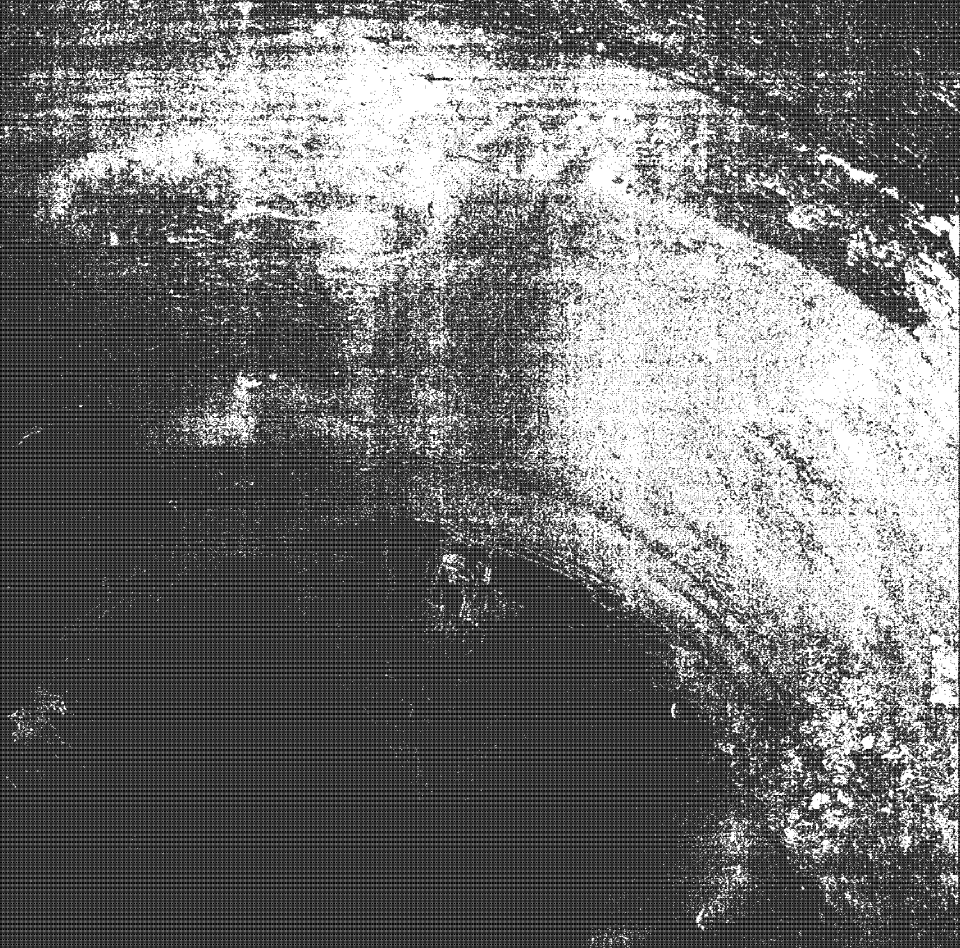
# Nozzle Tip Cracking

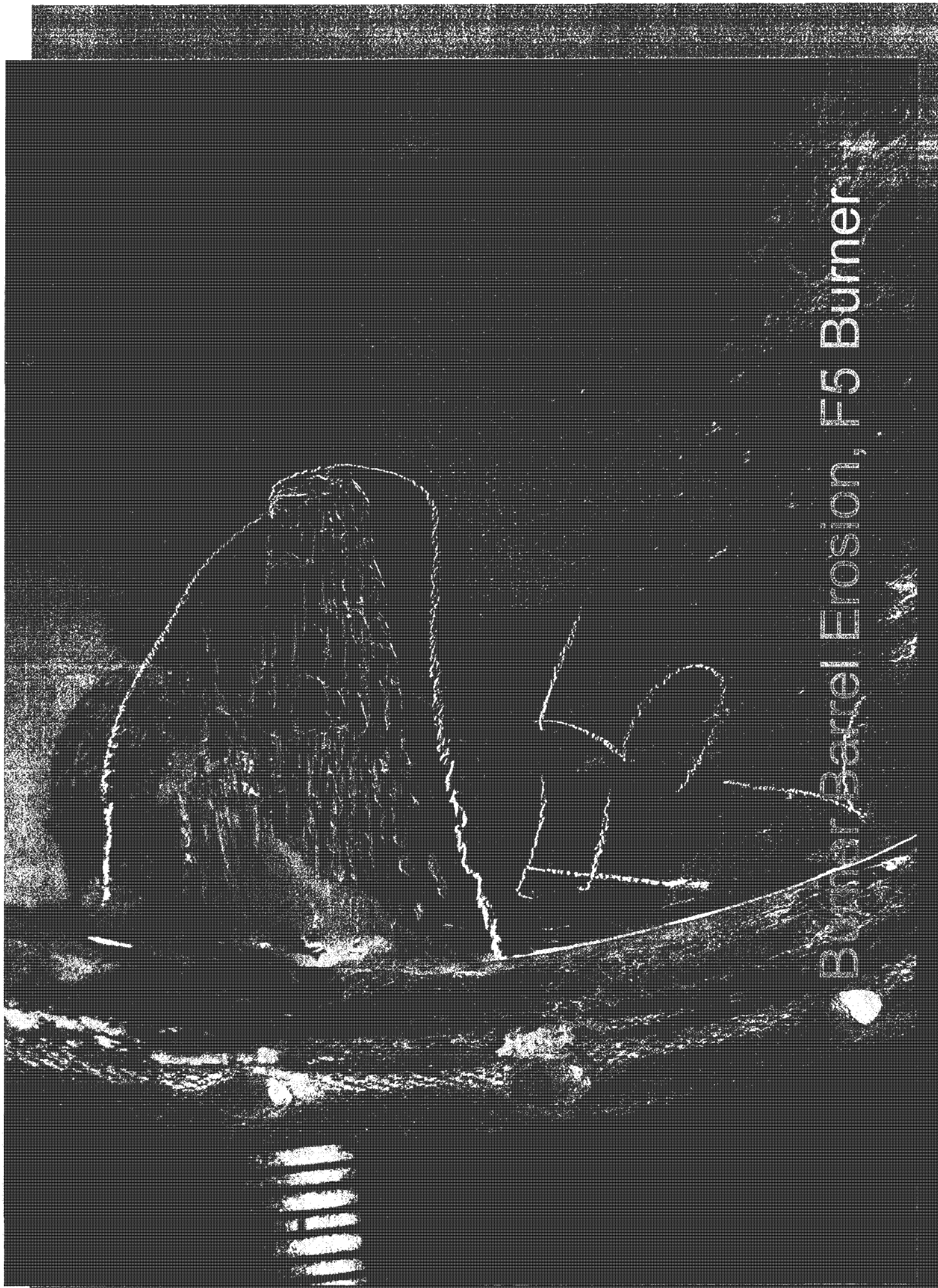
Nozzle Cracking from De-Burner

# Nozzle Cracking, D6 Burner

# G1 Burner Nozzle, Erosion Holes

Fig. 1





Burner Barrel Erosion, F5 Burner

# Air Flow

## Points of Contention

### ■ IPSC

- > Burner air flow should have been designed for 260,000 lbs/hr
- > Based on OEM mill curves at maximum plus 5% and mill outlet conditions.

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- > Erosion is the result of increased air and coal flows.

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# Summary and Resolutions

- IPSC will not backcharge ABT for all past repairs, materials and installation - \$604,000
- IPSC will pay for installation of the new fuel injectors and diffusers - est. \$250,000.
- ABT shall have a third party model flow and stresses to determine causes of failures.
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**From:** Jerry Hintze  
**To:** Hardin, Jason W.  
**Date:** 3/15/2007 3:00 PM  
**Subject:** Summary of meeting with Mr. Thomas Cochran, Siemens - ABT Burners  
**Attachments:** ABT and Siemens.pdf

**CC:** Cross, George; Killian, Dennis  
Resent with Attachment

Attending:

Thomas Cochran - Siemens  
George Cross - IPSC  
Jon Finlinson - IPSC  
Jerry Hintze - IPSC

Mr Cochran started out by explaining his position and duties with Siemens, past experience in the power industry and why Siemens acquired ABT. He explained that he did not know anything about the problems we were having with ABT until just a few weeks ago. ABT employees are now Siemens employees and the name ABT will disappear eventually.

We gave a short presentation to Mr. Cochran about our history with ABT and the problems we have been having with the burners (attached) including our final offer for settlement. Mr. Cochran expressed his desire to resolve the problem without litigation and indicated that he thought our offer was very generous.

He explained that he has the engineering expertise within his office to do the CFD and finite element models to solve this problem. He asked that we forward the presentation to his engineering manager, Mr. Michael Davidson, and they will get right on coming up with a plan for resolution.

George reiterated that this is our final offer and that we are not interested in further negotiations. Mr. Cochran indicated that he did not come to negotiate but, to try and solve the problem. George said that we would like to get something in writing as soon as possible and that we will hold up on filing the court papers if we can accomplish that. Mr Cochran indicated that he should be able to get us an answer in a couple of weeks as to what they can do and then we will finalize the commercial arrangements.

Garry Christensen took Mr. Cochran out to the bone yard to look at the burner nozzles removed during the 2006 outage.

IP7021104

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**To:** Hardin, Jason W.  
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IP7021105

**From:** "Davidson, Michael J O642" <michael.davidson@siemens.com>  
**To:** "Jerry Hintze" <JERRY-H@ipsc.com>, "Cochran, Thomas A O64" <thomas.cochr...>  
**Date:** 3/15/2007 2:58 PM  
**Subject:** RE: IPSC Presentation on ABT Burners

**CC:** "Dennis Killian" <DENNIS-K@ipsc.com>, "George Cross" <GEORGE-C@ipsc.com>  
Jerry,

Tom told me to expect the presentation. I will review and I am sure we will be talking.

Michael Davidson  
Manager, Engineering  
Boiler Technology Services  
Siemens Power Generation, Inc.

-----Original Message-----

From: Jerry Hintze [mailto:JERRY-H@ipsc.com]  
Sent: Thursday, March 15, 2007 4:34 PM  
To: Davidson, Michael J O642; Cochran, Thomas A O64  
Cc: Dennis Killian; George Cross  
Subject: IPSC Presentation on ABT Burners

Attached is a presentation that I gave Mr. Cochran at a meeting to discuss the problems we have been having with ABT's burners on Unit 2. He asked me to send it to you. Please let me know if you need something else.

Jerry Hintze  
Assistant Superintendent  
Intermountain Power Service Corporation  
850 W. Brushwellman Road  
Delta, Utah, 84624

Phone: 435-864-6460  
Fax: 435-864-0760  
Jerry-H@IPSC.COM

IP7021106

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Presentation for Siemens, March 15, 2007

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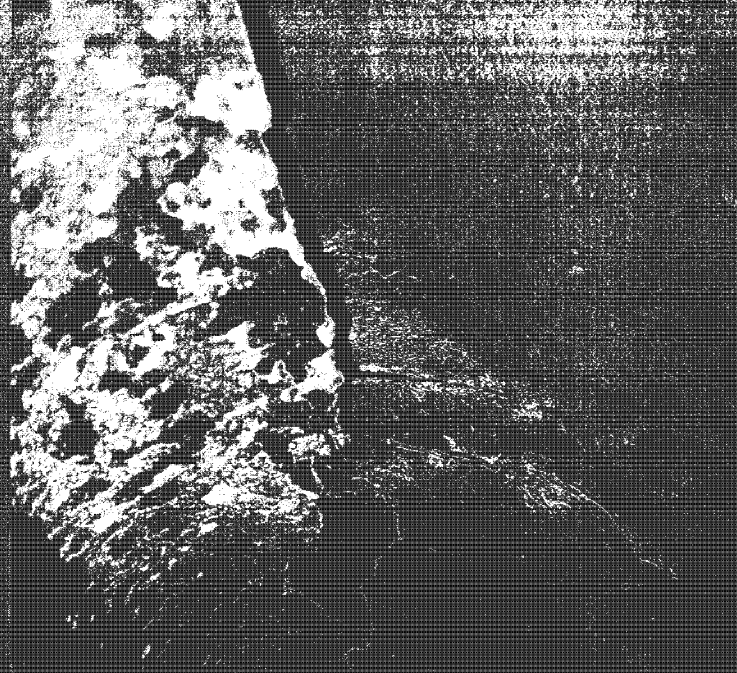
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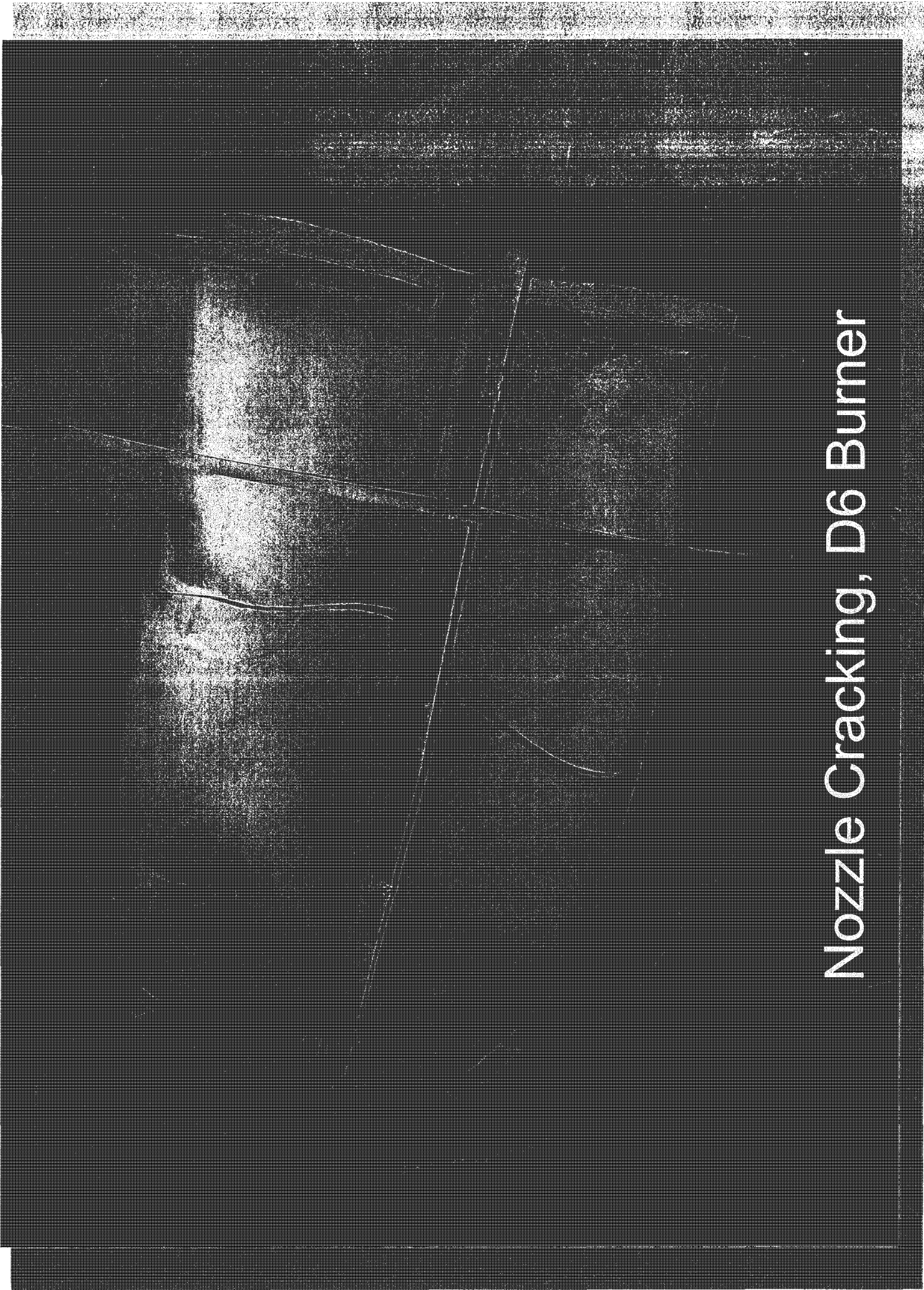
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# Nozzle Tip Cracking



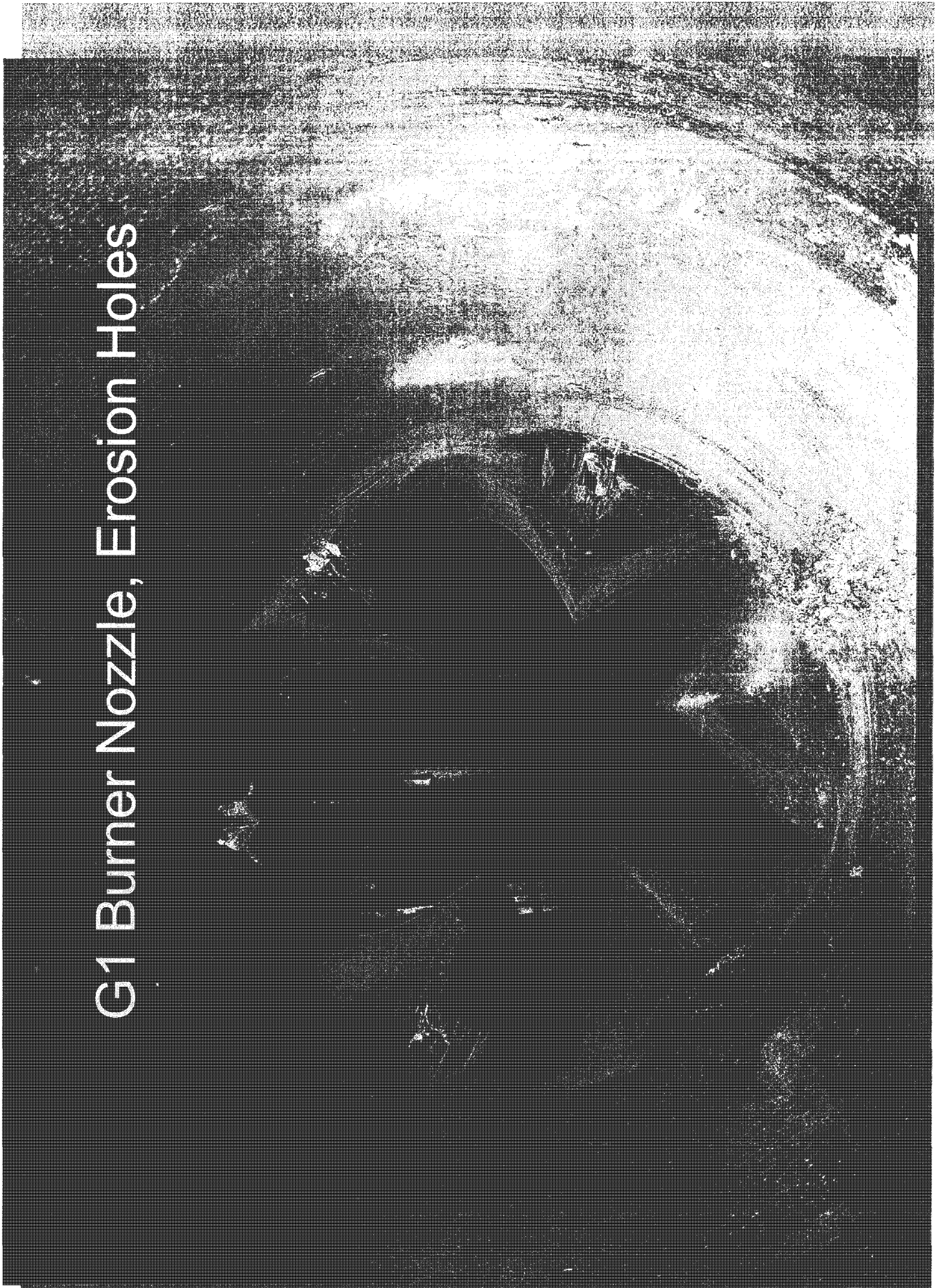
Dr. P. C. Burner

2007-2008

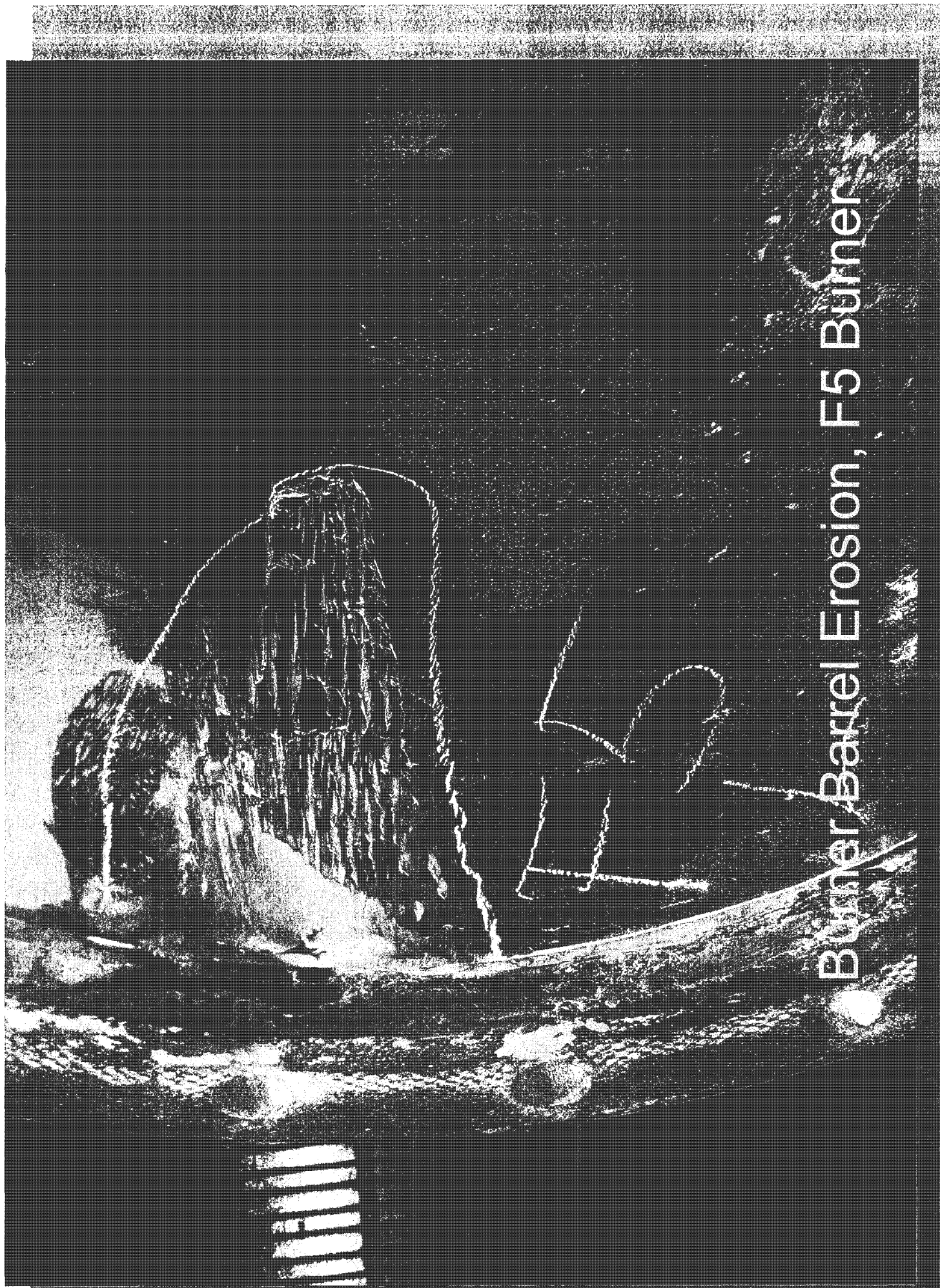


Nozzle Cracking, D6 Burner

# G1 Burner Nozzle, Erosion Holes



IP7021118



Burner Barrel Erosion, F5 Burner

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**From:** "Cochran, Thomas A O64" <thomas.cochran@siemens.com>  
**To:** "Jerry Hintze" <JERRY-H@ipsc.com>  
**Date:** 3/15/2007 2:40 PM  
**Subject:** Out of Office AutoReply: IPSC Presentation on ABT Burners

I will be out of the office on March 14, 2007, and returning March 19,2007. If you need imediate assistance, please contact Eric Martinez.

**IP7021124**

**From:** Jerry Hintze  
**To:** Hardin, Jason W.  
**Date:** 3/15/2007 2:56 PM  
**Subject:** Summary of meeting with Mr. Thomas Cochran, Siemens - ABT Burners

**CC:** Dennis Killian; George Cross  
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**IP7021125**

**From:** Jerry Hintze  
**To:** michael.davidson@siemens.com; thomas.cochran@siemens.com  
**Date:** 3/15/2007 2:34 PM  
**Subject:** IPSC Presentation on ABT Burners  
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Phone: 435-864-6460  
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Jerry-H@IPSC.COM

**IP7021126**

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# Nozzle Tip Cracking



Dr. De Burca

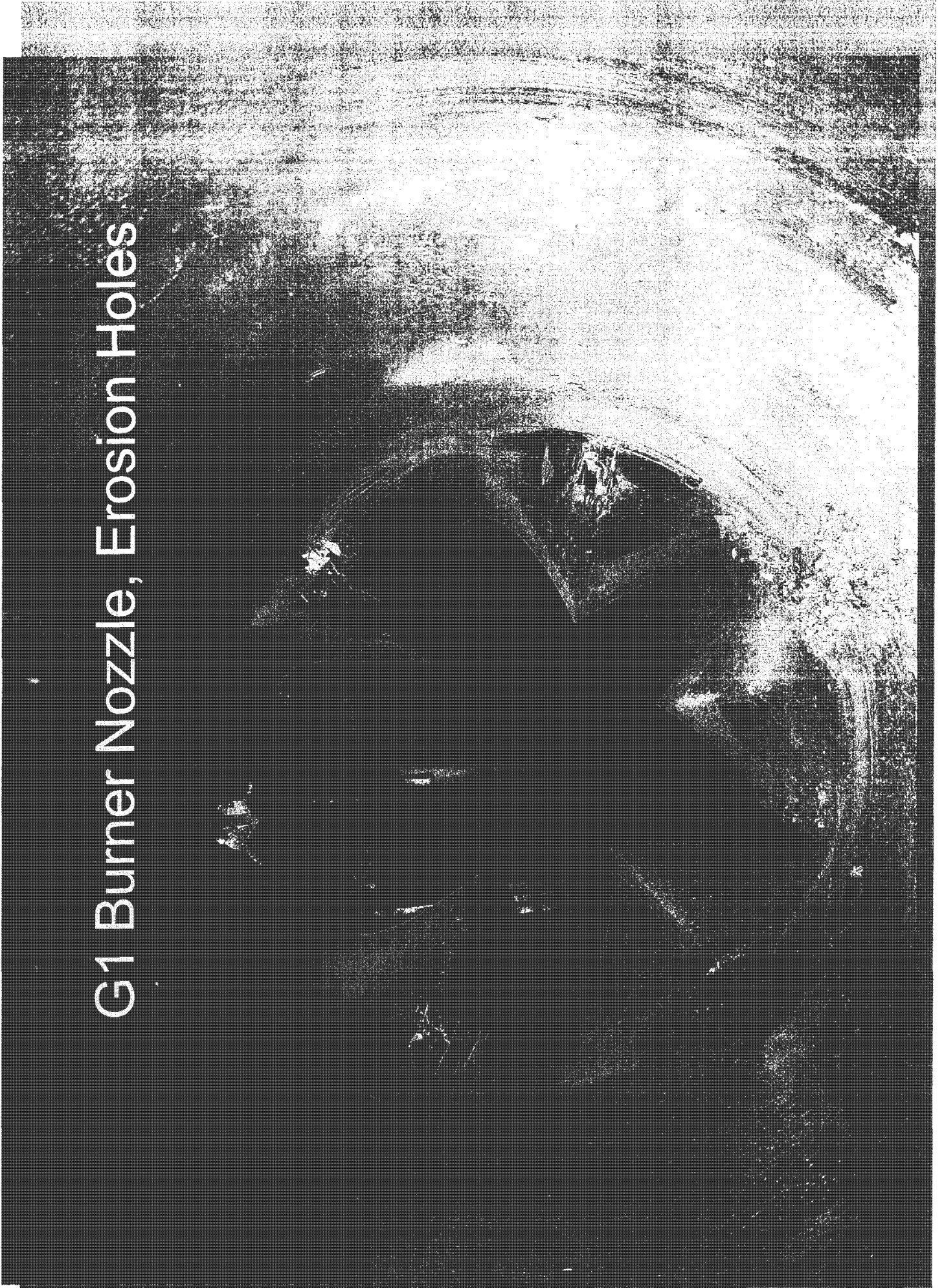
2000



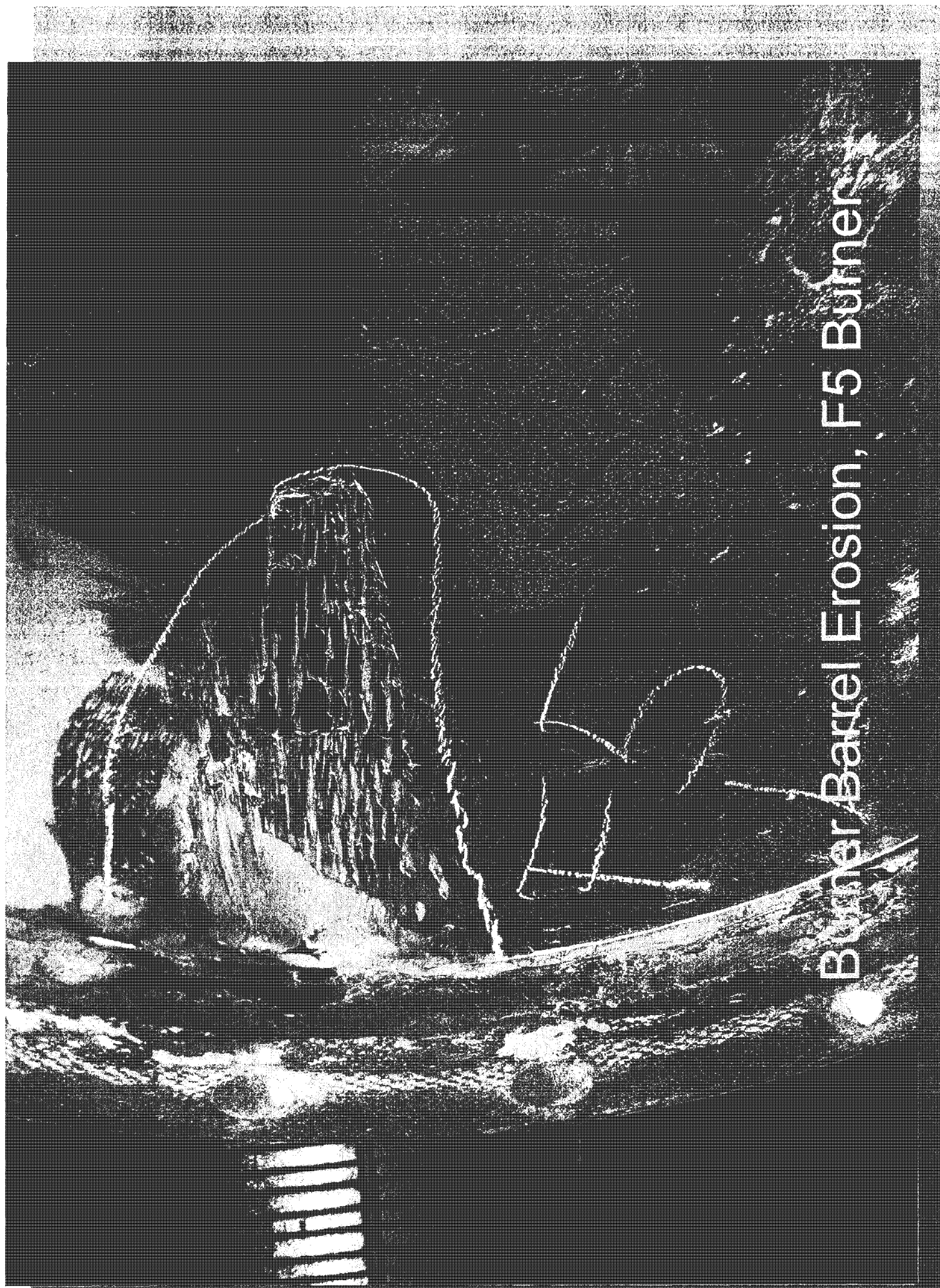
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IP7021137

# G1 Burner Nozzle, Erosion Holes



IP7021138



Burner Barrel Erosion, F5 Burner

# Air Flow

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# Nozzle Tip Cracking

Dr. D. C. Burner

211

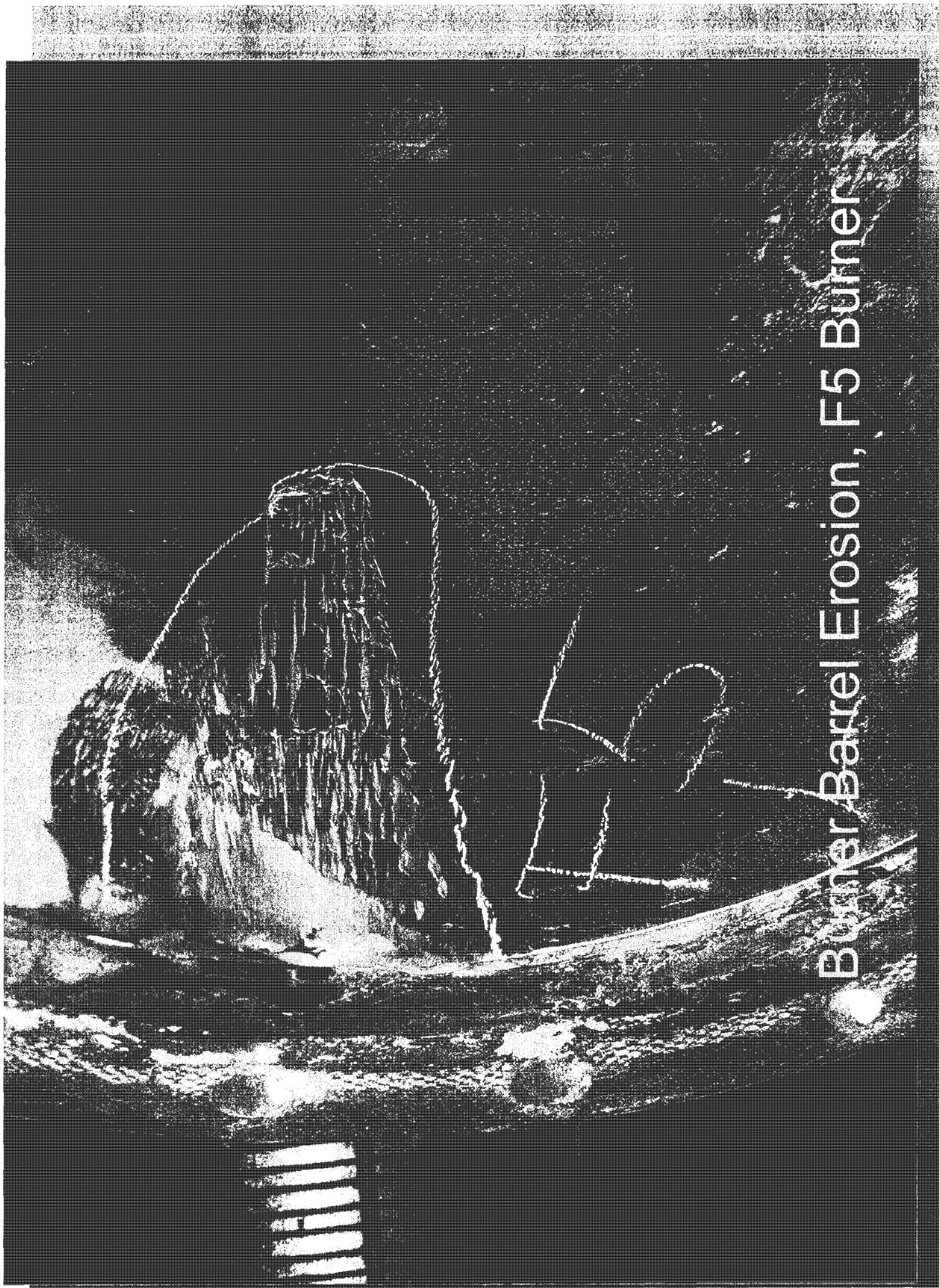


# Nozzle Cracking, D6 Burner

IP7021154

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**Date:** 3/14/2007 4:12 PM  
**Subject:** PDF Presentation of ABT - Siemens Presentation  
**Attachments:** ABT and Siemens.pdf



September 30, 2003

350 Main Street, Suite 5  
Bedminster, NJ 07921

P 908.470.0470

F 908.470.0479

www.advancedburner.com

Mr. George W. Cross, President and CEO  
Intermountain Power Service Corporation  
850 West Brush Wellman Road  
Delta, Utah 84624

Attention: James Nelson, Contract Administrator

Reference: Contract 04-45606 -Unit 2 Low NOx Burners

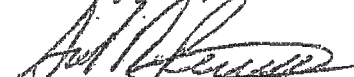
Dear Mr. Nelson:

We are progressing with design of the IGS Unit 2 burners and in the process have determined that we require the below listed information to complete our design:

- ✓ 1. What is the diameter of the hole in the windbox for the existing burners. We intend to stay within this diameter for installation of our burners if possible to minimize field work. The drawing IPSC provided us of the existing burners shows a dimension for this, however the actual dimension is omitted from our version.
- ? 2. IPSC provided us with an average primary air mass flow of 3500 lbs/min at Unit load of 950 MW. What is the corresponding steam flow under this load condition.
- ? 3. What is OD and length of outer Oil gun tube and mounting tube bolt pattern? On drawing you provided us (269375E, Rev. 10) there are 2 drawings listed that would give us this information, drawings 135723A and 135724A. Please forward these drawings if available.
- ✓ 4. What is the number and diameter of bolt holes, as well as the bolt hole circle, for the existing elbow outlet flange? We also need to know the bolt hole orientation of the elbow outlet for each burner (i.e. is top bolt on the vertical centerline or does it straddle the vertical centerline)?
- ? 5. What is the size of register support brackets (channel or tube?) that run between the tube wall and the windbox wall. These are shown on drawing you provided us 294359E, however there aren't any dimension on our version.
- ✓ 6. What is the fuel injector tip set back dimension, from the tube wall, for the existing burners? (Throat Depth).

Please provide us with this information ASAP or advise should you require clarification on any of this requested information.

Sincerely yours,

  
Sal N. Ferrara

cc: C. Onaitis